Office Memorandum • UNITED STATES GOVERNMENT

TO : Mr. R. C. Wychoff, CNO Bldg 52, Nav Obs DATE: 1-31-58

FROM : Code 5334, Naval Research Laboratory

SUBJECT: Moving Target Indicator - Proposed by Reg-372

1. The subject MTI system, though it appears workable for cw radar, would not be applicable to pulse radar such as is commonly used for search and control systems today.

2. Such radars, in order to obtain reasonable definition, must utilize pulse widths of a few microseconds; up to perhaps 20 usec. The use of such pulse widths results in an echo spectrum 50 kc or more in width. The doppler shifts on which the detection of moving targets depends will, with ordinary target speeds and radar frequencies, be in the range of a few cycles to a few hundred cycles. The problem of the moving target indicator is thus one of detecting a shift of a few hundred cycles (or less) in a spectrum 50 kc (or more) broad.

3. The familiar types of MTI system utilize some form of storage or memory device so that the radar echo actually examined for target motion will consist of the returns from 2 or more radar pulses. The use of more than one pulse causes the broad (50 kc or more) spectrum to take on the character of a line spectrum so that target movement is detected by the detection of the shift in each line of the spectrum. Thus, although the over-all spectrum is broad, the actual problem encountered becomes one of detecting shifts of the same order of magnitude as the width and spacing as the spectral lines.

4. In the subject MTI system, the source proposes to dispense with the memory system and thus to detect moving targets from a single pulse. In this case, the pulse spectrum would be described by a Fourier Integral rather than a Fourier series and would be a continuous spectrum instead of the line spectrum. The problem of detecting moving targets would then be one of detecting a frequency shift which was several orders of magnitude smaller than the width of the spectrum in which it took place. It is not believed that such a detection can be made by a practical mechanism and the subject proposal is therefore not believed to be practical.

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